DACA42- 02-C-0001

LOGANEnergy Corp.

Residence of Lt. Col. Luster PEM Demonstration Program, Fort McPherson, Atlanta, Georgia
Midterm Report

Proton Exchange Membrane (PEM) Fuel Cell Demonstration
Of Domestically Produced PEM Fuel Cells in Military Facilities

US Army Corps of Engineers
Engineer Research and Development Center
Construction Engineering Research Laboratory
Broad Agency Announcement CERL-BAA-FY01

Fort McPherson
Atlanta, Georgia

July 30, 2004

Executive Summary

In May 2003 LOGANEnergy Corporation received a contract modification to its CERL BAA FY01 PEM Demonstration contract award that added Ft McPherson to its project sites. LOGAN completed the installation of one Plug Power GenSys5C PEM fuel cell at Ft. McPherson and started the unit on October 31, 2003. However because of delays in acquiring high-speed commercial Ethernet service the WEB SCADA system was not activated until February 2, 2004.

The Combined Heat and Power (CHP) installation operates electrically in a grid parallel/grid independent configuration that ties several kitchen appliances and convenience outlets onto the fuel cell's critical load panel. The facility's hot water heater captures the unit's waste heat output. The installation is instrumented with an external wattmeter, BTU meter, thermometer and a gas flow meter. A phone line is connected to the power plant communication's modem to call-out with alarms or events requiring service and attention. In addition, this site has a web-enabled SCADA system that provides real time operational control, management and alarming.

The Point of Contact for this project is Luke Wayland. He may be reached at (404) 464-4177. The total estimated energy cost premium to the host site as a result in participating in this demonstration project is $698.34.

Table of Contents

Proposal – Proton Exchange Membrane (PEM) Fuel Cell Demonstration of Domestically Produced Residential PEM Fuel Cells in Military Facilities

1.0 Descriptive Title

Residence of Lt. Col. Luster PEM Demonstration Program, Fort McPherson, Atlanta, Georgia

2.0 Name, Address and Related Company Information

LOGANEnergy Corporation

1080 Holcomb Bridge Road
BLDG 100- 175
Roswell, GA 30076
(770) 650- 6388

DUNS 01-562-6211
CAGE Code 09QC3
TIN 58-2292769

LOGANEnergy Corporation is a private Fuel Cell Energy Services company founded in 1994. LOGAN specializes in planning, developing, and maintaining fuel cell projects. In addition, the company works closely with manufacturers to implement their product commercialization strategies. Over the past decade, LOGAN has analyzed hundreds of fuel cell applications. The company has acquired technical skills and expertise by designing, installing and operating over 30 commercial and small-scale fuel cell projects totaling over 7 megawatts of power. These services have been provided to the Department of Defense, fuel cell manufacturers, utilities, and other commercial customers. Presently, LOGAN supports 30 PAFC and PEM fuel cell projects at 21 locations in 12 states, and has agreements to install 22 new projects in the US and the UK over the next 18 months.

3.0 Production Capability of the Manufacturer

Plug Power manufactures a line of PEM fuel cell products at its production facility in Latham, NY. The facility produces three lines of PEM products including the 5kW GenSys5C natural gas unit, the GenSys5P LP Gas unit, and the GenCor 5kW standby power system. The current facility has the capability of manufacturing 10,000 units annually. Plug will support this project by providing remote monitoring, telephonic field support, overnight parts supply, and customer support. These services are intended to enhance the reliability and performance of the unit and achieve the highest possible customer satisfaction. Scott Wilshire is the Plug Power point of contact for this project. His phone number is 518.782.7700 ex1338, and his email address is scott_wilshire@plugpower.com.

4.0 Principal Investigator(s)

Name	Samuel Logan, Jr.	Keith Spitznagel
Title	President	Vice President Market Engagement
Company	Logan Energy Corp.	Logan Energy Corp.
Phone	770.650.6388 x 101	860.210.8050
Fax	770.650.7317	770.650.7317
Email	samlogan@loganenergy.com	kspitznagel@loganenergy.com

5.0 Authorized Negotiator(s)

Name	Samuel Logan, Jr.	Keith Spitznagel
Title	President	Vice President Market Engagement
Company	Logan Energy Corp.	Logan Energy Corp.
Phone	770.650.6388 x 101	860.210.8050
Fax	770.650.7317	770.650.7317
Email	samlogan@loganenergy.com	kspitznagel@loganenergy.com

6.0 Past Relevant Performance Information

a) Contract: PC25 Fuel Cell Service and Maintenance Contract #X1237022

Merck & Company
Ms. Stephanie Chapman
Merck & Company
Bldg 53 Northside
Linden Ave. Gate
Linden, NJ 07036
(732) 594-1686

Contract: Four-year PC25 PM Services Maintenance Agreement.
In November 2002 Merck & Company issued a four-year contract to LOGAN to provide fuel cell service, maintenance and operational support for one PC25C fuel cell installed at their Rahway, NJ plant. During the contract period the power plant has operated at 94% availability. LOGAN performs the quarterly and annual service prescribed by the UTC, and performs other maintenance as required. The periods of unavailability are chiefly due to persistent inverter problems that seem to be endemic to the Toshiba power conditioning balance of the system. Field modifications and operating adjustments have largely cured the problem. Quarterly service events take 10 hours to complete with the unit under load, and the annual event takes approximately 35 hours with the unit shut down.

b) Contract: Plug Power Service and Maintenance Agreement to support one 5kWe GenSys 5C and one 5kWe GenSys 5P PEM power plant at NAS Patuxant River, MD.

Plug Power
Mr. Scott Wilshire.
968 Albany Shaker Rd.
Latham, NY 12110
(518) 782-7700 ex 1338

LOGAN performed the start-up of both units after Southern Maryland Electric Cooperative completed most of the installation work. The units are located at residential sites at Patuxant River Naval Air Station, MD and operate in standard gird connected/grid independent configurations. Both operate at 4.5kWe and have maintained 98% availability. The units, S/Ns 241 and 242 are two of the very latest GenSys models to reach the field. S/N 242 is Plug Power's first LPG fueled system to go into the field. Both have set new performance standards, and raised expectations for near term commercial viability for this product. Operations to date are indicative of the success of the various test and evaluation programs that have been conducted over the past two years.

c) Contract: A Partners LLC; Commercial PC25 Fuel Cell Project Design, Installation and 5-year service and maintenance agreement.

Mr. Ron Allison
A Partners LLC
1171 Fulton Mall
Fresno, CA 93721
(559) 233-3262

On April 20, 2004 LOGAN completed the installation of a 600kWe PC25C CHP fuel cell installation in Fresno, CA. The system operating configurations allow for both grid parallel and grid independent energy service. The grid independent system is integrated with a Multi Unit Load Sharing (MULS) electronics package and static switch, which initial development was funded by ERDC CERL in 1999. This is the third fuel cell installation that uses the MULS System. The thermal recovery package installed in the project includes a 100-ton chiller that captures 210 degree F thermal energy supplied by the three fuel cells to support cooling loads on the first three floors of the host facility. The fuel cells also provide low-grade waste heat at 140 degrees F that furnishes thermal energy to 98 water source heat pumps located throughout the 12-story building during the winter months.

7.0 Host Facility Information

U. S. Army Garrison, Fort McPherson, is located in Atlanta, Georgia. Fort McPherson serves and supports a number of military departments: Active duty and reserve component soldiers, sailors, airmen and Marines, Department of Defense civilians, military retirees and family members of all of these.
In 1867 to 1868, a 10-company post was constructed on the 53 acres of leased ground at the southwest corner of Atlanta, and on December 30, 1867, was named McPherson Barracks in honor of Union Maj. Gen. James Birdseye McPherson. During the period 1881-1886, McPherson Barracks continued to serve as a summer encampment due to its climate, especially for troops assigned to subtropical Florida.

Today, as a headquarters, Fort McPherson houses and supports these major activities: U.S. Army Forces Command, Third U.S. Army/Forces Central Command, U.S. Army Reserve Command, Southeast Region Office for the U.S. Army, and the U.S. Army Center for Health Promotion and Preventative Medicine-South.
Georgia Power and Georgia Gas Company provide electricity and natural gas to the base, respectively.

8.0 Fuel Cell Installation

After reviewing several possible sites on the base, the home of Lt. Col and Mrs. Luster, Figure 1, was selected to host the installation. In June 2003, representatives of CERL, LOGAN and Fort McPherson held the project kick-off meeting. In July 2003, Plug Power shipped the unit, S/N 199, to Fort McPherson, where it was placed on its pad, as seen in Figure 2. The site is the oldest building on the base, circa 1880. Additional photos document the several tasks involved in the installation of the project. LOGAN worked closely with the Fort McPherson Environmental Department to insure the installation satisfied all environmental requirements. No permits were required or issued for this site. First start occurred on Oct 31, 2003, and the installation proceeded according to plan with minimal inconvenience to the base or the host site. It required 154 man-hours to complete the installation. With the connection of the Ethernet service on February 2, 2004 the unit became fully operational.

Figure 1, Fuel Cell Pad Site

Figure 2, Fuel Cell on Pad Site

Figure 3 shows another photo of the unit on its pad. The gray box in the background houses the DI/RO water supply panel as well as the RTU, which provides Web connectivity to the site.

Figure 3, Natural Gas & Electrical Interfaces

Figure 4, Meters and Housings

Figure 4 is a close up of the equipment housing mentioned above. The photo also shows the installation of both the fuel cell electric and natural gas meters.

Installation Line Diagram

Fort McPherson PEM Installation Line Diagram

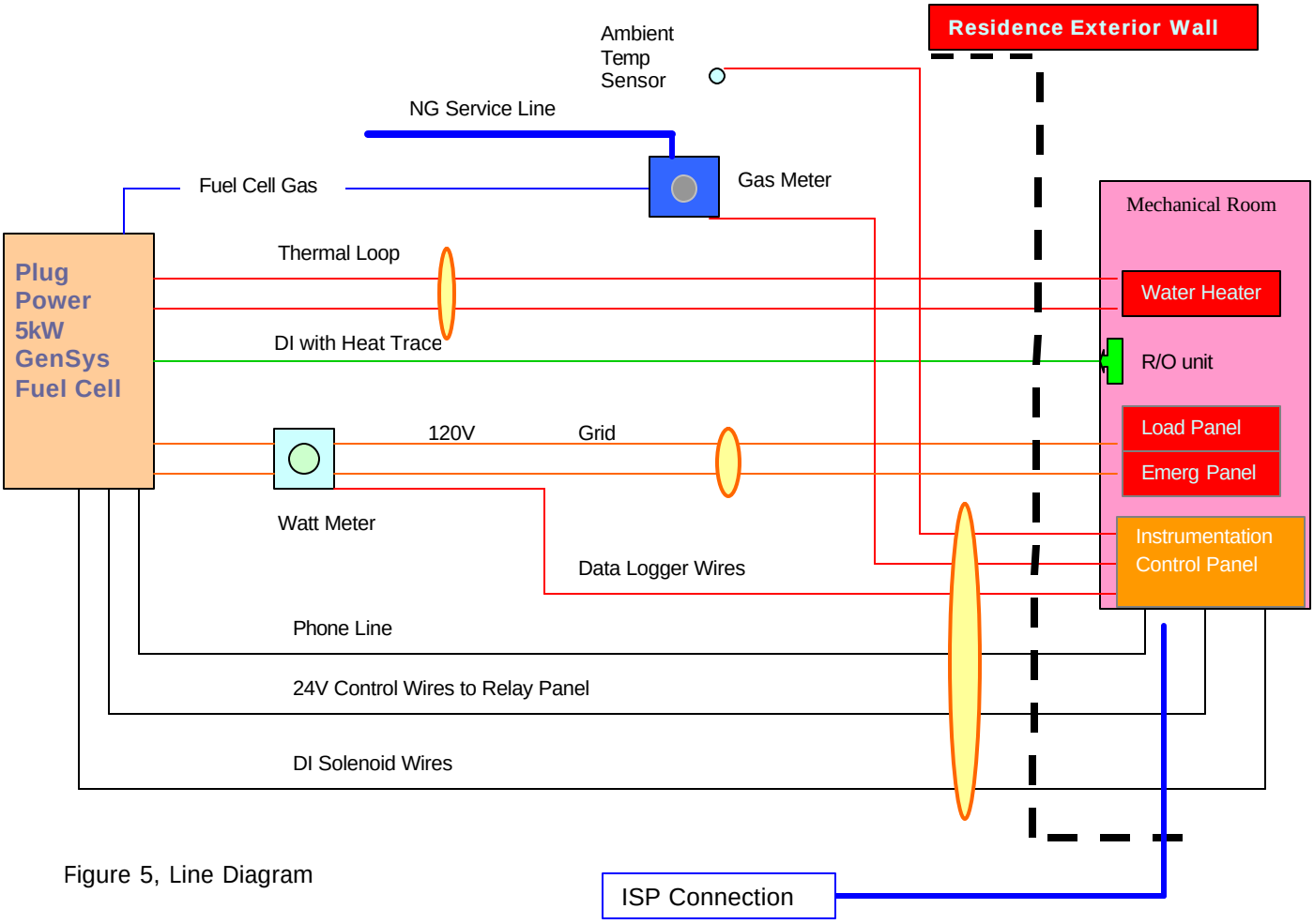


Figure 5, Line Diagram

Figure 5, above, describes a one line diagram of the Fort McPherson fuel cell installation. The diagram illustrates utility and control interfaces including, gas, power, water and instrumentation devices installed in both the residential equipment room and the exterior equipment chest at the Luster residence.

The electrical conduit that runs between the facility load panels and the fuel cell are approximately 40 feet. The Reverse Osmosis/DI water tubing that provides filtered process water to the power plant is approximately 10 feet distance, and the thermal recovery piping that runs between the fuel cell and the hot water heater is also approximately 40 feet.

9.0 Electrical System

The fuel cell inverter has a power output of 110/120 VAC at 60 Hz, matching the building distribution panel in the mechanical room with its connected loads at 110/120 VAC. The installation includes both a grid parallel and a grid independent configuration as indicated in Figure 6. The unit provides stand-by power to a new 100amp critical circuit panel that serves several kitchen appliances and other plug loads. A two-pole wattmeter monitors both the grid parallel and grid independent conductors to record fuel cell power distribution to both the existing panel and the new critical load panel.

10.0 Thermal Recovery System

Fuel Cell waste heat flows to a Heliodyne heat transfer coil that maintains the domestic hot water tank at 130 degrees F, which should be adequate to meet the domestic hot water demand of the facility.

Figure 6, below, shows the method of providing fuel cell waste heat with the existing hot water tank. The "U" shaped coil is a Heliodyne Heat Exchanger mounted on the wall adjacent to the tank. The other major components are indicated in the boxes below with arrows pointing to their locations.

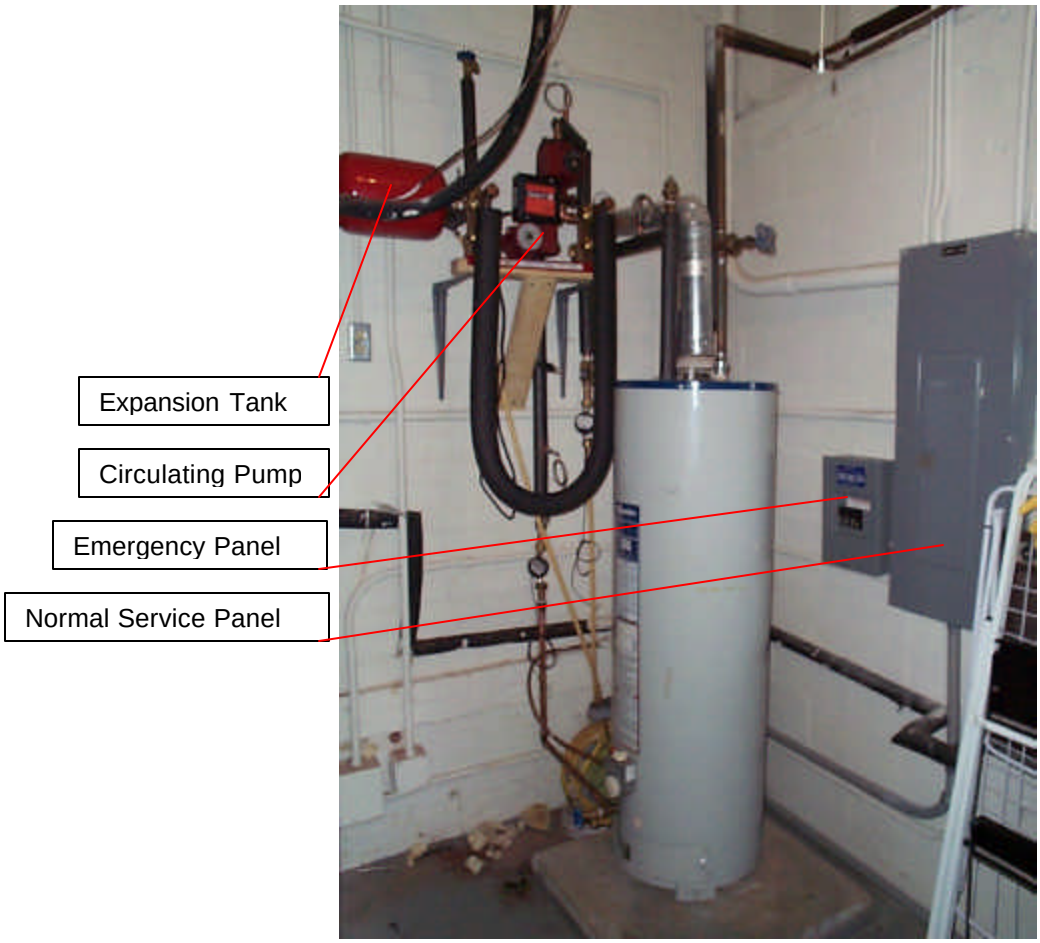


Figure 6, Thermal Recovery Package

11.0 Data Acquisition System

Figure 7, Instrumentation and RTU Housing

Figure 7 displays a photo of a LOGAN fuel cell technician connecting instrumentation wiring to the RTU terminals that will transmit operating and performance data via a VPN to LOGAN's distributed generation control center in Rochester, NY.

Over the course of developing the several sites in the FY01 PEM Program, LOGAN has encountered great difficulty in acquiring a dedicated phone line for the fuel cell at every site. In the best case this has delayed starting the Demonstration Period by three weeks. Most sites have proven far more difficult. These experiences have taught LOGAN to be very explicit with the host POC at the kick-off meetings concerning the necessity for providing a dedicated phone line, since much of the success of the project is dependent upon reliable communications with the unit.

As with its Coast Guard Station PEM installation in New Orleans, Louisiana, LOGAN decided once again to install a web-based, real time, data management and reporting system at Ft McPherson. To do this LOGAN contracted with Connected Energy Corporation, CEC, to provide the service. The drawing seen in Figure 8, below, describes the architecture of the CEC system operating at the site. The system provides a comprehensive data acquisition solution, and also incorporates remote control, alarming, remote notification, and reporting functions as well by means of a VPN that maintains connectivity between the fuel cell site and the control center in Rochester, NY.

With the introduction of this system at Ft McPherson, LOGAN continues to learn new lessons in Web based CHP resource management. The service installation at Ft McPherson was initially hampered by miscommunications between LOGAN and the POC as to what high-speed service was available to the base. Once LOGAN determined that high-speed Internet service could be provided to the site, the project waited on service to be processed for the site for nearly three months. Other problems ensued with billings. The service provider would only send bills to the address of the actual service not to LOGAN's office. So it was not until a service interruption that

LOGAN discovered this issue and promptly paid for the entire year's service to prevent further interruptions.
Another important lesson that LOGAN has learned with this system is the critical role that individual instrumentation component parts play in supplying the data to the web interface. The CEC system requires very precise signals from the outputs of these devices. The gas meters, wattmeters, flow meters and thermal elements invariably require signal strength adjustment at the RTU terminals to insure that their discrete inputs are readable by the CEC system. Discovering the proper voltage range required for each signal loop is most often achieved by trial and error, requiring multiple site visits to establish a readable connection. In other instances LOGAN has discovered that flow metering devises and thermal couples often require high levels of maintenance and/or replacement to support continuous data collection. It was not until late April that these issues were clearly diagnosed and appropriate corrections made so that thermal recovery data could be accurately maintained. However, the field experience learning curve has been rapid, and LOGAN is building a body of knowledge and expertise with this system that will yield improved results and better data as new sites are added to the WEB support system in the future. Figure 9, on page 13, is an example of one of many data screens that are maintained by the CEC system and displayed on the web. A sample data graph is also attached to Appendix 2 providing heat recovery data for the months of February through May.
To view the operation of this unit, online go to: https://www.enerview.com/EnerView/login.asp Then login as: logan.user and enter password: guest. Select the box labeled Ft McPherson. Then you may navigate the site or other LOGAN sites using the tool bars or html keys.

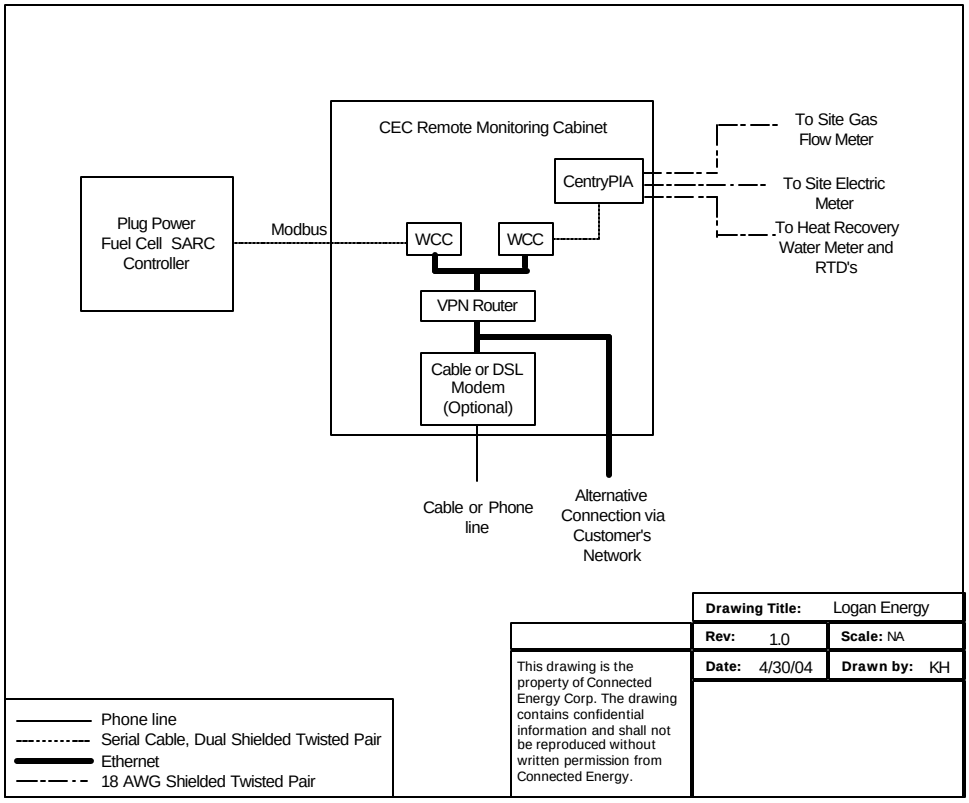


Figure 8, Connected Energy System Architecture

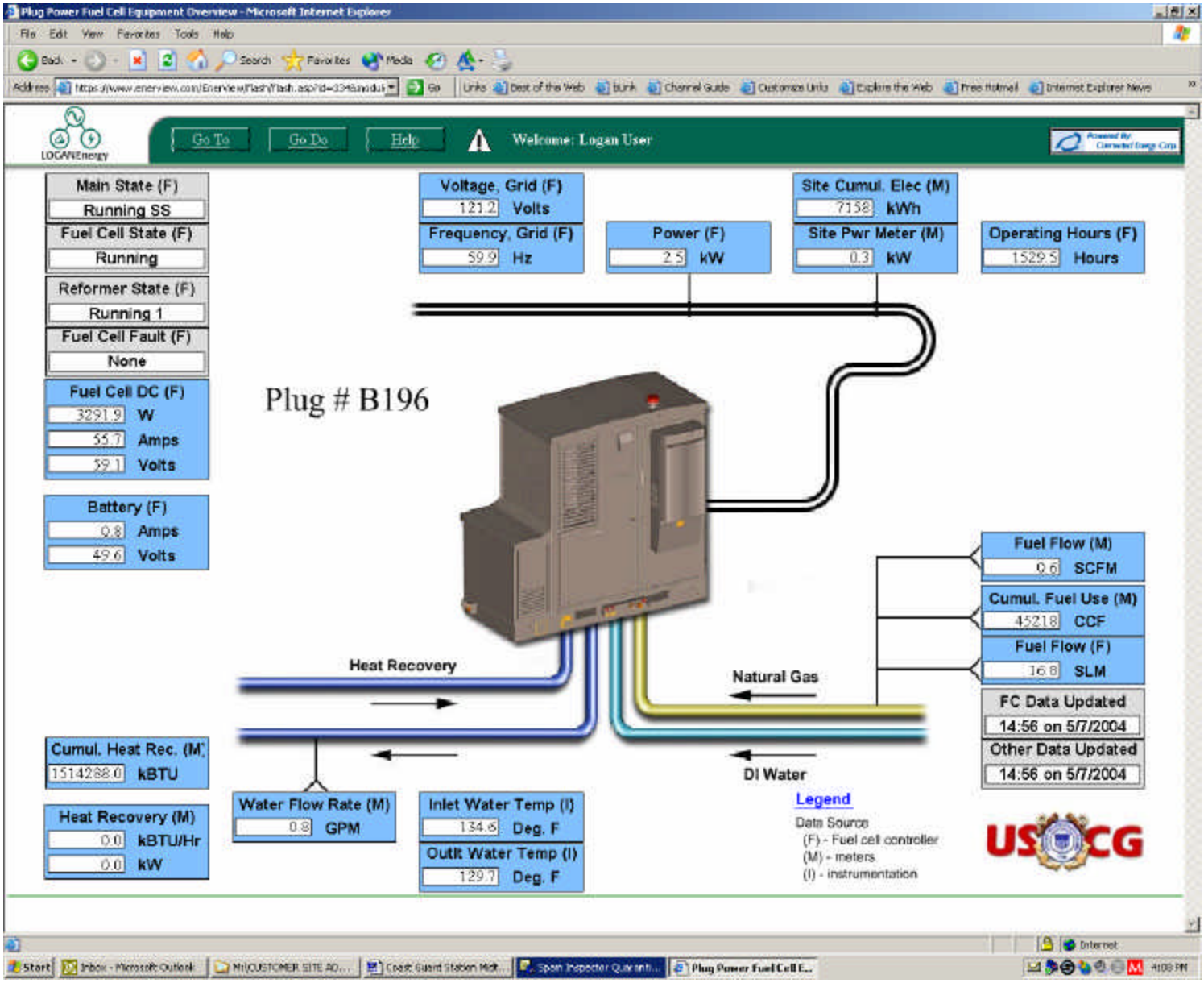


Figure 9, Connected Energy Web Data Screen

12.0 Fuel Supply System

LOGAN connected the fuel cell gas piping into the existing natural gas service line adjacent to the fuel cell pad, and installed a flow meter to calculate fuel cell usage as indicated in Figure 4. A regulator at the fuel cell gas inlet maintains the correct fuel cell operating pressure at 14 inches water column.

13.0 Installation Costs

Fort McPherson

Project Utility Rates		**Utility**
1) Water (per 1,000 gallons)	$12.13	City of Atlanta
2) Utility (per KWH)	$0.0500	Georgia Power
3) Natural Gas (per MCF)	$6.63	Georgia Gas Co.

First Cost	**Estimated**	**Actual**
Plug Power 5 kW GenSys5C	$ 65,000.00	$ 65,000.00
Shipping	$ 1,800.00	$ 1,060.00
Installation electrical	$ 1,250.00	$ 924.00
Installation mechanical & thermal	$ 3,200.00	$ 1,700.00
Watt Meter, Instrumentation, Web Package	$ 3,150.00	$ 2,950.00
Site Prep, labor materials	$ 925.00	$ 1,125.00
Technical Supervision/Start-up	$ 8,500.00	$ 13,860.00
Total	**$ 83,825.00**	**$ 86,619.00**
Assume Five Year Simple Payback	$ 16,765.00	$ 17,323.80

Forcast Operating Expenses	Volume	$/Hr	$/ Yr	
Natural Gas Mcf/ hr @ 2.5kW	0.03	$ 0.22	$ 1,716.47	
Water Gallons per Year	14,016		$ 170.01	
Total Annual Operating Cost				$ 1,886.49

Economic Summary			
Forcast Annual kWH		19710	
Annual Cost of Operating Power Plant	$	0.096	kWH
Credit Thermal Recovery Rate		($0.010)	kWH
Project Net Operating Cost	$	0.085	kWH
Displaced Utility cost	$	0.050	kWH
Energy Savings (Cost)		($0.035)	kWH
Annual Energy Savings (Cost)		($698.34)	

Explanation of Calculations:

Actual First Cost Total is a *sum* of all the listed first cost components.
Assumed Five Year Simple Payback is the Estimated First Cost Total *divided by* 5 years.

Forecast Operating Expenses:

Natural gas usage in a fuel cell system set at 2.5 kW will consume 0.033 MCF per hour. The cost per hour is 0.033 Mcf per hour *x* the cost of natural gas to the site per MCF at $6.63. The cost per year at $1716.47 is the cost per hour at $0.22 *x* 8760 hours per year *x* 0.9. The 0.9 is for 90% availability.

Natural gas fuel cell systems set at 2.5 kW will consume 1.6 gallons of water per hour through the DI panel. The total volume of water consumed at 14,016 gallons per year is 1.6 gph *x* 8760 hours per year. The cost per year at $170.01 is 14,016 gph *x* cost of water to the site at $12.13 per 1000 gallons.

The Total Annual Operating Cost, $1886.49 is the *sum of* the cost per year for the natural gas and the cost per year for the water consumption.

Economic Summary:

The Forecast Annual kWh at 19,710 kWh is the product of 2.5 kW set-point for the fuel cell system *x* 8760 hours per year *x* 0.9. The 0.9 is for 90% availability.

The Annual Cost of Operating the Power Plant at $0.096 per kWH is the Total Annual Operating Cost at $1886.49 *divided by* the forecast annual kWh at 19,710 kWh.

The Credit Annual Thermal Recovery at -$0.010 is 7800 *divided by* 3414. This is then *multiplied by* 0.9 *x* 0.1*x* the cost of electricity at $0.0500 per kWh *x* (-1). As a credit to the cost summary, the value is expressed as a negative number.

The Project Net Operating Cost is the *sum* of the Annual Cost of Operating the Power Plant *plus* the Credit Annual Thermal Recovery.

The Displaced Utility Cost is the cost of electricity to Barksdale per kWh.

Energy Savings (cost) equals the Displaced Utility Cost *minus* the Project Net Operating Cost.

Annual Energy Savings (cost) equals the Energy Savings *x* the Forecast Annual kWh.

Appendix

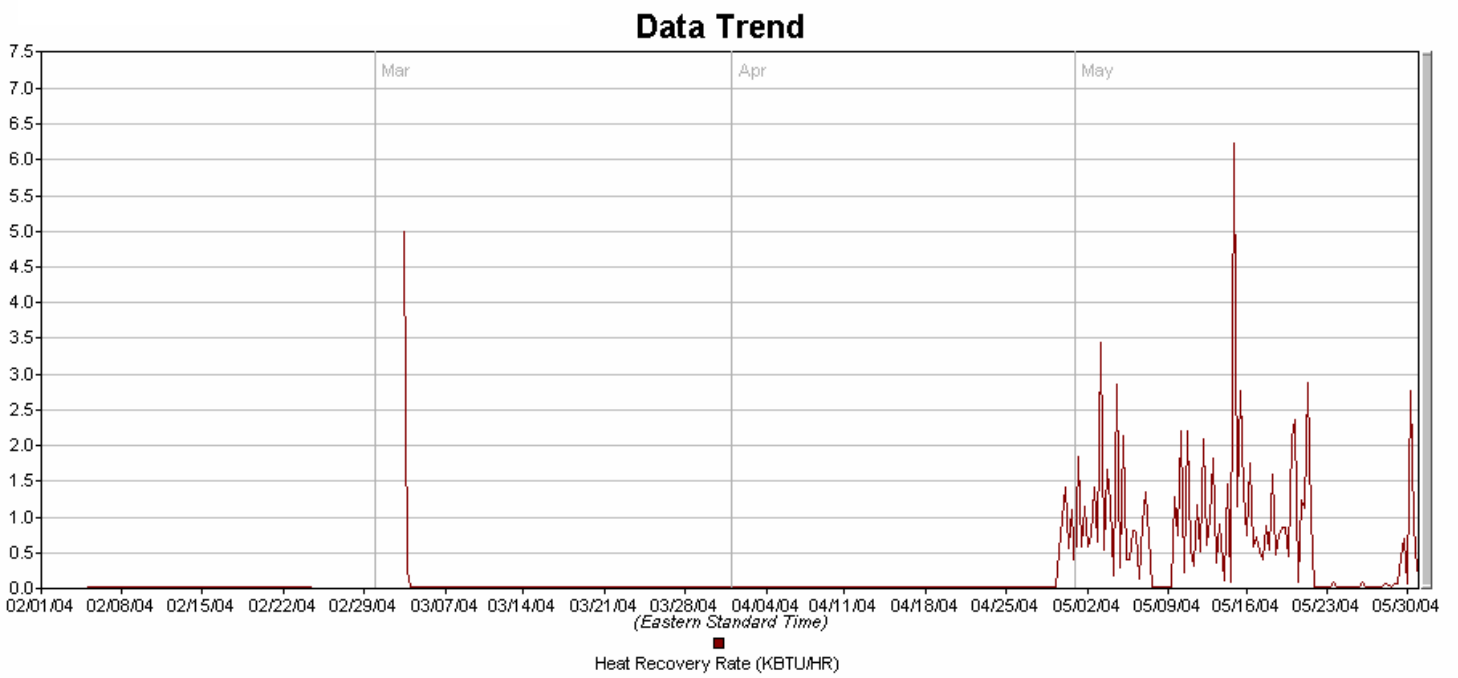
1) Monthly Performance Data
2) Data Graph of Thermal Recovery
3) Installation/ Acceptance Test
4) Sample Work Log

1) Monthly Performance Data

Fort McPherson
Atlanta, Georgia

	Oct-03	Nov-03	Dec-03	Jan-04	Feb-04	Mar-04	Apr-04	May-04
Run Time (Hours)	34	704	290	536	696	576	687	744
Time in Period (Hours)	34	720	744	744	696	744	720	744
Availability (%)	100.0%	98.0%	39.0%	72.0%	100.0%	77.0%	95.0%	100.0%
Energy Produced (kWe-hrs AC)	81.0	1,655.0	677.0	1,277.0	1,654.0	1,403.0	1,688.0	1,861.0
Output Setting (kW)	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
Average Output (kW)	2.38	2.35	2.34	2.38	2.38	2.44	2.46	2.51
Capacity Factor (%)	47.7%	46.0%	18.2%	34.3%	47.5%	37.7%	46.9%	50.1%
Fuel Usage, LHV (BTUs)	1120000	23100000	9580000	5091	5084	5628	6861	7711
Fuel Usage (SCF)	1,108.0	22,811.0	9,471.0	17,172.0	17,148.0	18,983.0	23,143.0	26,009.0
Electrical Efficiency (%)	24.7%	24.5%	24.1%	25.1%	32.6%	25.0%	24.6%	24.2%
Thermal Heat Recovery (BTUs)								
Heat Recovery Rate (BTUs/hour)	0	0	0	0	0	0	0	0
Thermal Efficiency (%)	0%	0%	0%	0%	0%	0%	0%	0%
Overall Efficiency (%)	24.7%	24.5%	24.1%	25.1%	32.6%	25.0%	24.6%	24.2%
Number of Scheduled Outages	0	1	1	2	1	0	0	0
Scheduled Outage Hours	0	16	454	208	0.5	0	0	0
Number of Unscheduled Outages	0	0	0	0	0	1	1	0
Unscheduled Outage Hours	0	0	0	0	0	168	32.7	0

2) Trending of monthly Thermal Recovery
for Ft McPherson PEM Installation



3) Installation/ Acceptance Test

An 8-hour acceptance test was run on Oct 31, 2003 by the technician following completion of all the commissioning tasks listed in the Checklist attached below. It was the first successful start-up of the system. Please see Appendix 3 for documentation of the test done by the technician.

Installation/Acceptance Test Report

Site: Fort McPherson, Atlanta, GA

Installation Check List

TASK	Initials	DATE	TIME (hrs)
Batteries Installed	KW	9/23/03	2
Stack Installed	KW	8/19/03	3
Stack Coolant Installed	KW	9/23/03	1
Air Purged from Stack Coolant	KW	9/23/03	2
Radiator Coolant Installed	KW	9/23/03	3
Air Purged from Radiator Coolant	KW	9/23/03	1
J3 Cable Installed	KW	10/29/03	1
J3 Cable Wiring Tested	KW	10/29/03	0.5
Inverter Power Cable Installed	KW	9/24/03	0.5
Inverter Power Polarity Correct	KW	9/24/03	0.5
RS 232 /Modem Cable Installed	KW	10/29/03	0.5
DI Solenoid Cable Installed with Diode	KW	9/24/03	0.5
Natural Gas Pipe Installed	KW	9/24/03	8
DI Water / Heat Trace Installed	KW	9/24/03	4
Drain Tubing Installed	KW	9/23/03	1

Commissioning Check List and Acceptance Test

TASK	Initials	DATE	TIME (hrs)
Controls Powered Up and Communication OK	KW	10/30/03	4
SARC Name Correct	KW	10/30/03	1
Start-Up Initiated	KW	10/30/03	6
Coolant Leak Checked	KW	10/30/03	1
Flammable Gas Leak Checked	KW	10/30/03	1
Data Logging to Central Computer	KW	10/30/03	2
System Run for 8 Hours with No Failures	KW	10/31/03	8

4) Work Log for Keith Williams, Mike Harvell, Jeff Worley
LOGANEnergy Field Technicians
August '03-April '04

Date	Activity	Hours
8/18/03	Drove to McPherson, bought gravel and worked on the pad.	6
8/19/03	Finished the pad, rented a forklift, and set the fuel cell into position. Installed the stack.	9
8/20/03	Met with contractors at the site to get bids.	8
9/18/03	Worked with contractors on electrical and plumbing, marked underground utility lines.	16
9/23/03	Filled glycol and therminol systems, purged air from coolant loops, buried RO waste line.	11.5
9/24/03	Electricians finished connections. Finished plumbing connections. Soldered heliodyne control wires, installed new SARC software, and powered up the fuel cell. Encountered problems in start procedure.	11.5
10/29/03	Drove to McPherson, pulled cable from fuel cell to storage unit and hung Connected Energy box.	8
10/30/03	Finished all power plant connections as well as Connected Energy connections and started up.	14.5
10/31/03	Commissioning of fuel cell after 8-hour system run.	8
11/25/03	Intermittent data transfer, stopped on 11/12 then received successful upload on 11/15. None since. Phone line polarity was good but when tried to connect to the system, kept getting busy signal. Installed 2 light bulbs in storage unit to prevent DI freezing. Problems with Connected Energy wiring.	12
12/16/03	Drove to McPherson to resolve unexpected shutdown. Troubleshoot Connected Energy system and tried to wire the box correctly, but still encountering problems. Found a battery with loose connection and melting area around it. Restarted unit followed by shutdown the next morning.	12
1/23/04	Ethernet connection acquired and installed.	3
2/04/04	Connected Energy data transfer finally achieved. Replaced 3 water filters and encountered Nat. Gas meter problems.	11
2/20/04	Returned to test inverter calibrations and inspect tightness of connections. Relayed info. to Plug, shut the fuel cell down, input new commands, recalibrated inverter, restarted.	9
3/02/04	Fuel cell running, but inverter problems continue as it cycles between control mode 3 and 5. Upon calling the system the inverter looked ok. Will hold off on replacing inverter.	1
3/03/04	Melissa, Keith and Mike work at correcting Connected Energy communication issues. Flow meters not responding correctly. Loaded new software onto SARC and had shutdown issues late in the date related to CE box.	9.5
3/04/04	Melissa, Keith and Mike work at correcting CE communication issues. Fixed RTD problem but now flow meters will not work at all. Fuel cell continued to shutdown in response to false signal from CE box.	12.5
3/11/04	System has been running but will not transmit data via modem. This has been a problem since SARC v1.28 was installed. Met	4

	onsite with Jeff and fixed modem callout issue that dealt with incorrect data logging. Reconfigured data logging, performed modem test, system running.	
3/21/04	Unexpected shutdown. Drove to site, changed water filters and restarted.	8
4/12/04	Unexpected shutdown, again due to Hum. Top High. Changed RO filter and restarted. Issue with shutdowns not related to the water, but the pressure. RO filter had not passed adequate water volume.	14
4/23/04	Jeff arrived at McPherson to remedy Connected Energy flow meter response issues. Meters not pulsing the Connected Energy card and unable to resolve the problem.	8
4/29/04	Troubleshoot problems with Comcast Modem. Modem lost “activation” from the Comcast service provider. Situation resolved.	8